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(52) UK CL (Edition K)
H4L LDSX LFM L1H10
G1U UR2908
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None

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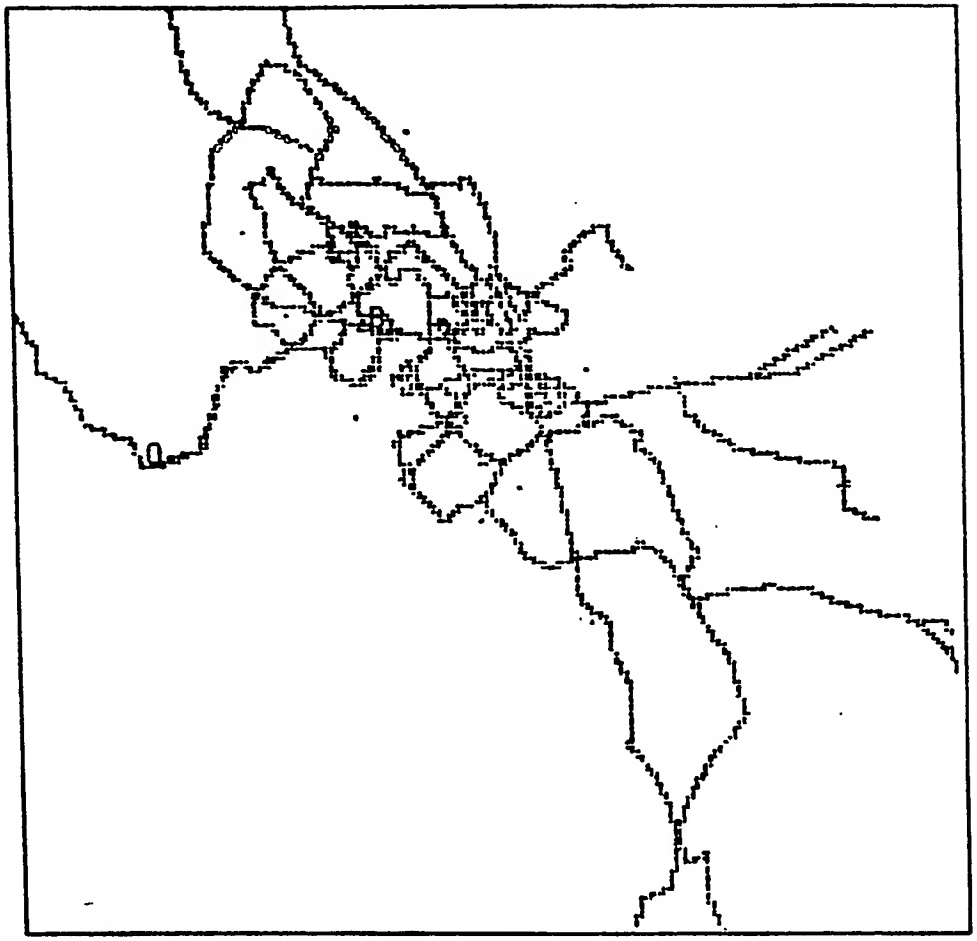
(54) Method for determining the degree of coverage in a mobile radio system

(57) As an aid in cell planning in a cellular mobile radio system, at each of a number of geographical points field strength values from all base stations are determined and the highest value at that point is compared to a predetermined coverage limit value. Holes in the coverage by the system may thus be identified. Results may be presented graphically with those coordinate points having a maximum field strength below, or above, the limit value being marked on the graph.

GB 2 236 457 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.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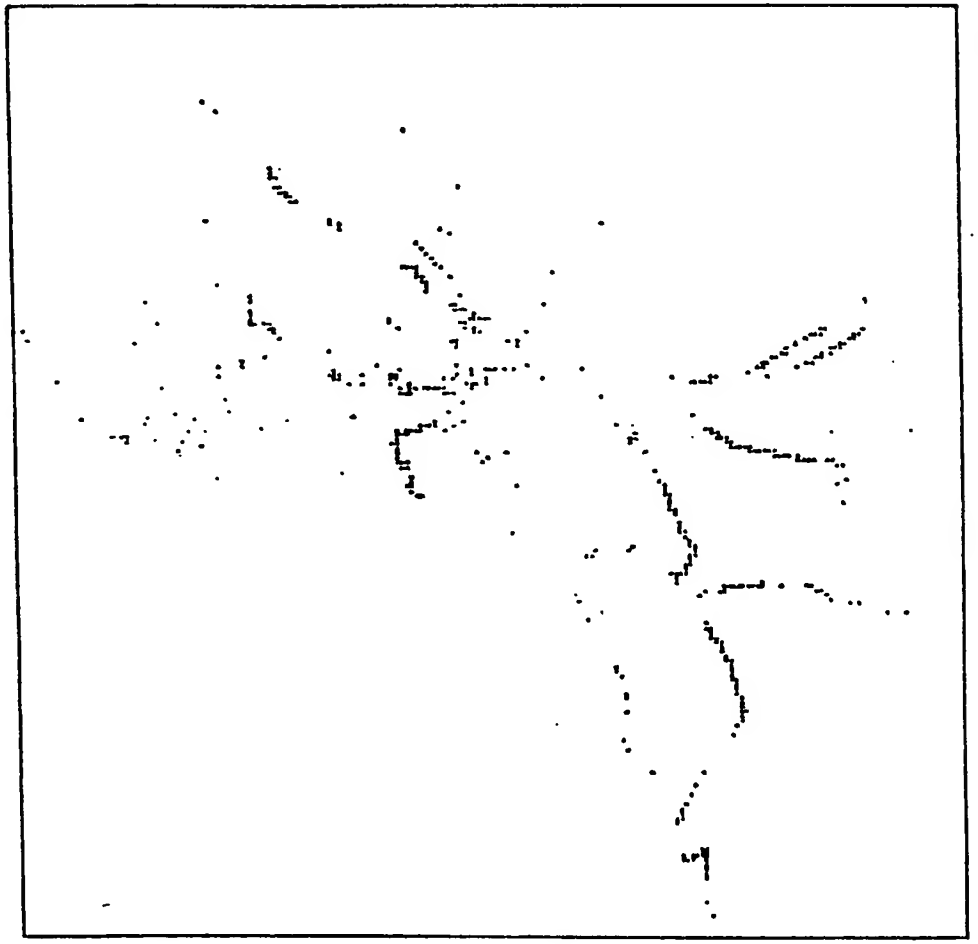
0.
X: 160935 164555
Y: 655992 659236
11-APR-89
COVERAGE DBM:
-130.0
C/I:
-99.0
INTERFERENCE %:
0.0
MEDIAN C:
-125.6
80-DEC C:
-105.3
MEDIAN I:
-120.9
80-DEC I:
-101.3

Fig.1.

ALVIK 0. X: 160935 164555 DOWNLINK INTERFERENCE
\STERMALM 0. Y: 655992 659236



11-APR-89
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C/I:
18.0
INTERFERENCE %:
0.0

MEDIAN C:
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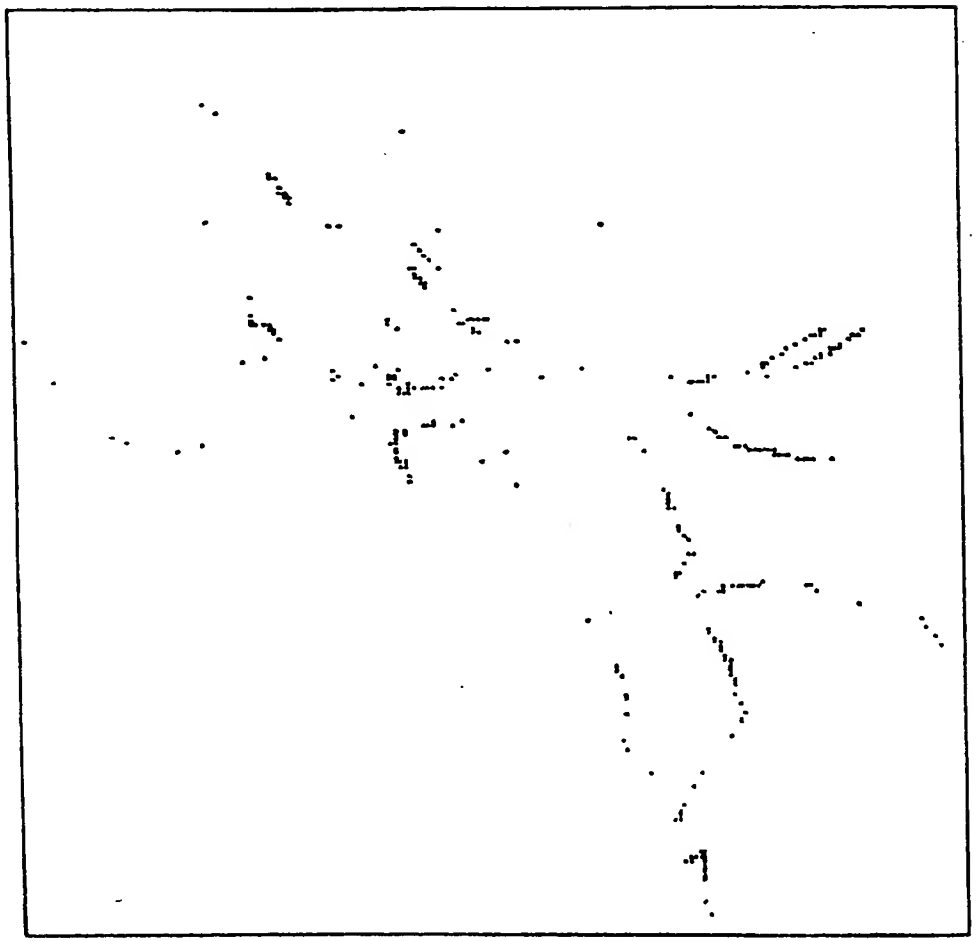
80-DEC C:
-81.9
MEDIAN I:
-999.0
80-DEC I:
-999.0

2/4

Fig.2.

ALVIK 0. X: 160935 164555 DOWNLINK INTERFERENCE
\STERMALM 0. Y: 655992 659236



11-APR-89
COVERAGE DBM:
-100.0
C/I:
18.0
INTERFERENCE %:
0.0

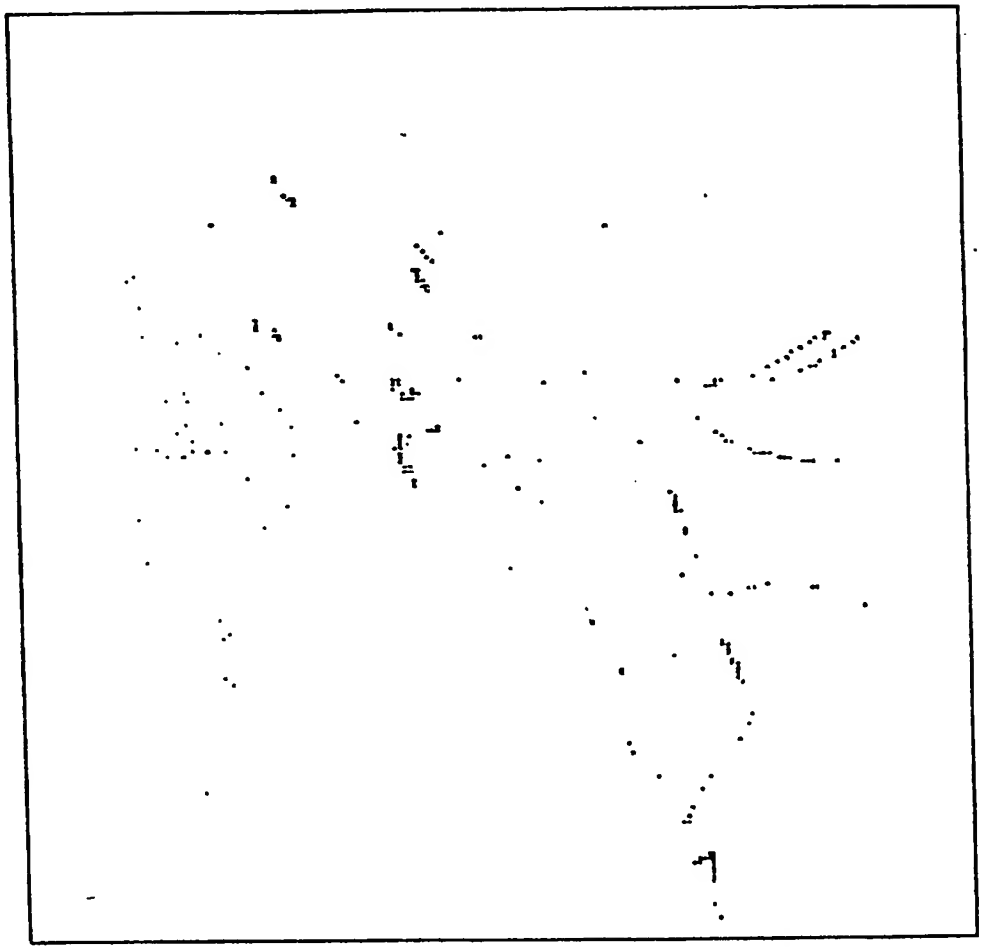
MEDIAN C:
-92.4
80-DEC C:
-84.2
MEDIAN I:
-999.0
80-DEC I:
-999.0

Fig.3.

ALVIK

0. X: 160935 164555
0. Y: 655992 659236

DOWNLINK INTERFERENCE



11-APR-89

COVERAGE DBM:

-103.0

C/I:

18.0

INTERFERENCE %:

0.0

MEDIAN C:

-94.8

80-DEC C:

-84.2

MEDIAN I:

-999.0

80-DEC I:

-999.0

4/4

Fig.4.

TITLE OF THE INVENTION: METHOD FOR DETERMINING THE DEGREE OF COVERAGE IN A MOBILE RADIO SYSTEM

FIELD OF THE INVENTION

The present invention relates to a method for determining what coverage, seen overall, is obtained with a number of base stations in a mobile radio system or alternatively where there are "holes" in an intended total coverage. The invention is directly related to the problems set in Patent Applications 8900742-1, 8900743-9, 8900744-7 and 8900745-4 and especially to the invention "Method for radio cell planning" (8900744-7). This latter method utilizes field strength measurements and an allocating algorithm which permit a simple adaptation of the cell system, that is to say an increase or decrease in the number of cells, upon a change in traffic demand. For the method to operate in the intended way, an acceptable coverage of the traffic demand must be produced with the aid of a number of cells with suitable transmitter powers or antenna arrangement. The invention described here provides a method for checking, with the aid of information stored in a data base and obtained with field strength measurements around all large main roads in, for example, a metropolitan area, that the desired coverage is actually achieved.

PRIOR ART

The operator of a mobile radio system has hitherto not had detailed knowledge of the field strengths received at a mobile unit from base stations existing in the mobile unit radio system. If there have been "holes" in the coverage, this has been disclosed, for example, by way of complaints from customers or by having observed that the system has not been able to

handle the desired traffic in certain situations. The present invention makes it possible to obtain accurate control of where coverage with a given coverage limit value is obtained, and to what extent extra cells must be planned in, or if it is sufficient to increase base station powers.

SUMMARY OF THE INVENTION

The invention provides a method for checking the degree of coverage, seen overall, over a number of cells in a mobile radio system by means of the fact that:

field strengths from all base stations are measured/calculated for all important traffic routes in the mobile radio system,

a data base is established so that all field strength values are addressable for arbitrary space coordinates within the area in which the measurements are carried out,

for each space coordinate the field strength values from all base stations are classified and the highest field strength value is noted, and values thus noted are compared with a predetermined coverage limit value.

It is preferably illustrated in a graph either where the highest field strength value exceeds a given coverage limit value along the traffic routes or where the value drops below the highest field strength value along the traffic routes, which latter case corresponds to so-called "holes" in the coverage.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a road network south of Stockholm which has been the object of measurements.

Figures 2 - 4 are examples of graphs of the absence of coverage defined at three different limit values of -97, -100 and -103 dBm.

DETAILED DESCRIPTION OF THE INVENTION

The radio part in a mobile radio system consists of a number of base stations with individual coverages and existing mobile units. By coverage at a given geographical point or in a given geographical area is meant that the field strength values exceed a specified limit value which ensures good operation in the system and an acceptable signal/noise ratio. The degree of coverage is thus a qualitative measure of the size of a geographical area which has coverage. When a mobile unit leaves the individual coverage of a base station to go over to communicate with an adjoining base station instead, it is important that the field strength does not at any time significantly drop below the coverage limit value. If this occurs and no adjoining base station can provide a sufficient field strength for coverage, a so-called "hole" occurs in the coverage which can signify a breakdown in the communication between base and mobile unit which is irritating for the parties telephoning.

Fig. 1 shows an example of a road network around a base station, in this case Alvik in the Stockholm area. The points represent geographical coordinates where the field strength has been measured. Low field strengths (-130.0 dBm) have also been included so that the entire road network can be shown.

In Figures 2 - 4, the points represent geographical points where the field strength is lower than the limit value for coverage. An absence of coverage constitutes so-called "holes" with respect to the coverage limit values specified. Figures 2 - 4 are thus "negative" images of the coverage in the area. The coverage limit values are -97, -100 and -103 dBm for Figures 2, 3 and 4, respectively, thus successively lower limit values. It can also be seen that the lower the limit value set, the fewer holes there are.

The present invention thus provides an aid for controlling the degree of coverage in radio cell planning.

According to the invention, field strengths from

all base stations are measured/calculated for all important traffic routes in the mobile radio system. A data base is set up so that all field strength values are addressable for arbitrary space coordinates whithin the area in which measurements are carried out. The field strength values from all base stations are classified for each space coordinate and the highest field strength value is noted and compared with the coverage limit value.

A graph illustrates either where the highest field strength value exceeds a given coverage limit value along the traffic routes or where the value drops below the highest field strength value along the traffic routes, which latter case corresponds to so-called "holes" in the coverage.

CLAIMS

1. Method for checking the degree of coverage in a mobile radio system, comprising a number of base stations with associated individual coverage areas and mobile stations,. in which respect field strengths from all base stations are measured/calculated for all important traffic routes int he mobile radio system, characterised n that

the field strength values from all base stations are compared for each geographical coordinate and the highest of these values is noted, and

values thus noted for each geographical coordinate are compared with a predetermined coverage limit value.

2. Method according to claim 1, characterised in that a graph is produced with the aid of the field strength values noted for each geographical coordinate, only those coordinates which represent field strength values lower or higher than a particular coverage limit value being marked in the graph.

3. Method of checking a degree of coverage in a mobile radio system substantially as hereinbefore described with reference to the accompanying drawings.

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